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1945

# THE PAN-PACIFIC ENTOMOLOGIST

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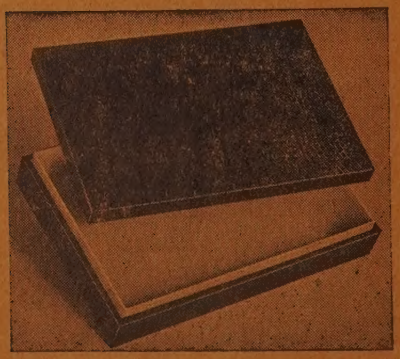

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# PROFESSIONAL TRAINING IN ENTOMOLOGY*

BY M. A. STEWART
*University of California, Berkeley*

From time to time papers have been written and speeches have been delivered concerning the teaching of entomology and committees have been appointed to study the problem of training entomologists. However, little or no action has resulted from these efforts to rationalize the professional education of entomologists and to develop reasonably uniform curricula of high standards comparable to those required of students in the older professions. Curricula in entomology, even those generally regarded as being among the best, have developed, in very large part at least, more or less under the stimuli of personal interests of prominent faculty members, rather than as the result of careful and exhaustive studies of the legitimate demands upon, and the responsibilities of, the profession of entomology and the consequent needs of the student. No whole-hearted and successful attempt has been made to standardize, within reasonable limits, the curricula in entomology in the leading universities, which should result ultimately in the adoption of similar programs of study by the smaller and less well endowed institutions. As a consequence of this somewhat *laissez faire* attitude and failure to develop rigidly professional and more or less uniform curricula, young entomologists graduating from different colleges manifest a remarkable dissimilarity in philosophy of their science, in magnitude and character of information and even in appreciation of their responsibilities and opportunities.

The education of students of entomology is a matter of pertinent concern to teacher upon whom is imposed the responsibility of well equipping these young people for successful and competent careers and of anticipating new demands upon entomologists as the scope of the profession expands and as new approaches and new interrelationships with other fields of science develop as a consequence of the normal evolution of the profes-

* Presidential address read before the Pacific Coast Entomological Society, January 6, 1945.

sion. Furthermore, responsibility for maintaining, and increasing wherever possible, the standards and competency of professional entomology largely and inevitably rests upon the teachers. Entomological education obviously is of paramount importance to students who are preparing to enter the profession and who rightfully expect their teachers and institutions to equip them well for the career upon which they intend to embark. The training of students of entomology is equally important to entomologists who are engaged exclusively in research, regulatory work and other entomological occupations distinct from teaching, since they not only have a natural interest and pride in the profession of which they are members, but also have the responsibility of hiring from time to time young entomologists of whom they expect adequate qualifications. Finally, the general public which financially supports entomology is justified in expecting, and even demanding, thoroughly competent entomologists and entomological service of the highest calibre. Thus we see that the education of students of entomology is an extremely pertinent matter to both professional workers, actual and potential, and to the general public. Particularly must the teachers and the colleges consciously recognize the *noblesse oblige* that is inescapably theirs.

In order to properly appreciate and evaluate the problem which confronts us, we may ask ourselves certain fundamental questions.

The first basic question to answer is what is an entomologist? This question can be answered simply by stating that he is a person engaged in the study of the accumulated and accepted knowledge of insects and certain other arthropods with reference to the discovery of general truths or the operation of general laws and in adding to this knowledge and making practical applications of it. However, for the more thorough appreciation and evaluation of the problem of professional training in entomology, it is better to erect a more complete definition which recognizes that an entomologist is first a biologist, second a zoologist and finally an entomologist. This more basic concept emphasizes the true position of the entomolgist as a scientist and more clearly indicates the exact nature and magnitude of his specialized training. It should be obvious that failure to accept such a point of view will inevitably result in imposing upon the student restrictions which will narrow the scope of his activities in contributions to

his field of science. The acceptance of this definition elucidates the extent of specialized education concerned directly with entomology, and without regard to the correlated subjects, demanded for true professional status. Extending the definition to completion, one must accept the fact that entomology is so complex as to necessitate subdivision into the specialized fields of systematics and the several aspects of applied entomology.

The second question that must be satisfactorily answered is, what are the responsibilities of entomology as a profession? The most readily apparent reply is that entomology is concerned with the protection of man's food and clothing, much of his financial investment and his health and that of his domesticated animals from the direct and indirect ravages of arthropods. It is also responsible for the possible furtherance of the effectiveness of insects beneficial to man and his interests. A moment's reflection presents the fact that entomologists engaged exclusively in what is called, for the sake of convenience, applied entomology are not able to completely discharge their responsibilities alone. Systematists should be working in closest collaboration with such entomologists and supplying them with basic information.

Since, by previous definition, entomology in part is also concerned with the discovery of general truths and the operation of general laws, responsibility rests upon the profession for training competent workers in taxonomy and encouraging adequate museum facilities and for providing personnel for bionomic and other systematic studies and investigations. These entomologists together with the economic workers effect the compilation of scientific entomological knowledge.

A third type of responsibility is met by providing professionally trained entomologists for research and service in the insecticide industry.

It is manifest that in each of these general aspects of entomology, which jointly share the professional responsibilities, there are numerous highly developed specialties. At a casual glance it might appear that these specialties are rather distinct and narrowly restricted. Such a concept is entirely erroneous. It is highly urgent that each specialist be sufficiently thoroughly trained in entomology and allied basic subjects and indoctrinated with the broad scientific point of view to have a good working knowledge and sound appreciation of the other fields of entomological specialization. The degree of individual competency

and ethical success of the profession is in direct proportion to the completeness and rationality of the professional training afforded to the student.

The preceding statements and analyses are admittedly not new and are elementary, but it is necessary to review the concepts they express and to keep them in mind constantly if the current requirements for professional status in entomology are to be critically examined and if a rational approach is to be made to the problem of future improvements in entomological education.

Before advancements can be made in the professional training of entomologists, with consequent elevation of standards and greater competency in discharging ethical professional obligations, the faults and deficiencies in prevailing entomological curricula must be recognized.

Perhaps the most prominent fault in our curricula is failure to recognize clearly the truly professional status of entomology and to treat it accordingly. It is true that we speak of the profession of entomology, but not with a full and conscious realization of the significance of the term and recognition of the responsibilities membership in it incurs. We have not benefited by the educational experiences of the older professions such as medicine, law and chemistry. Failure to profit by the experience and history of older and comparable fields of effort inevitably results in some retardation of progress. Not one of the older professions would accept new students to more or less full status late in their undergraduate years, or omit a rather definite schedule of prerequisites, or permit widely dissimilar courses of study, or fail to differentiate between pre-professional and professional courses. Departments of instruction in entomology, however, are guilty of all of these educational misdemeanors.

Another fault in entomological education is failure to view the field as a whole and as a distinct discipline with necessary ramifications and delimitations. This is a reflection of a weakness in recognition and appreciation of the fundamental and scholarly philosophy upon which the profession must be based. Such definitions as are presented earlier in this paper must be accepted and abided by to avoid this serious pitfall of omission. Lack of clearly defined concepts and goals and logical approaches to these goals inhibit, if not prohibit, the attainment of adequate curricula and professional competency.

The absence of some reasonable degree of standardization of

entomological curricula constitutes a serious obstacle in developing consistently entomologists of truly professional calibre. Anyone who has ever been concerned with the teaching of entomology at the graduate level has been strongly impressed by the great divergencies in the character and magnitude of undergraduate curricula in different universities. The obvious result of such a lack of standardization of curricula is that the employer of young entomologists must pay undue attention to the school from which an applicant graduates, and even to the professors under whom he studied, and cannot assume, making exceptions for normal differences in native intelligence, industry and integrity, that almost all young graduates in entomology are more or less equally competent professionally.

It is deplorable that nearly every department of entomology in the United States fails to differentiate in practice, if not in regulations, between undergraduate or pre-professional and graduate or professional courses. One finds a remarkable hodgepodge of courses upon examination of the curriculum for a given semester, or year, of almost any student in entomology. This is, perhaps, particularly true of the graduate student, who frequently is taking concurrently one or more undergraduate courses and courses of the most advanced nature.

Because of an apparent inability to recognize that entomology is a distinct discipline and must be treated accordingly, even though it may transect or be intimately correlated with many other fields, or even a group of fields as well exemplified by the relationship between entomology and agriculture *per se*, there is often indecision as to what subjects should be required in the curriculum and even sometimes vitally essential courses are sacrificed because of a mistaken conviction that certain other courses should be required. It must be recognized that the first responsibility of the department of entomology and the first obligation to the students is that of adequate training for competency in the precise discipline of entomology as a profession and that other courses are of secondary importance, except those which are actually basic to entomology and those which should be reasonably expected as a part of the cultural education that should be claimed by and demanded of every college graduate.

A laxity in the matter of prerequisites has already been suggested in the comparison made between departments of entomology and departments or schools training students in the older

professions. The most serious neglect to prerequisites occurs not so much in the courses in entomology as in the proper sequence and correlation of basically important courses outside of those restricted to entomological studies and upon which thorough competency in entomology depends and also of prerequisites to eligibility for admission to graduate school and adequacy for instruction at the graduate level. It is almost the rule, rather than the exception, to see graduate students in entomology pursuing studies which should have been completed during undergraduate years. It is indeed tragic that such an easily solved problem persists even in our better institutions.

Partly because of lack of accurate appreciation and understanding of the discipline of entomology as a science, partly because of lack of properly organized curricula, partly because of lack of serious study of the needs of the student preparing for a professional career in entomology and partly because of failure on the part of teachers to anticipate probable future demands upon entomology we find, perhaps more frequently than not, a deplorable lack of breadth of training in our entomologists, not only in the more narrowly restricted science of entomology itself but more especially in the basic fields upon which entomology is dependent. It is doubtful if there is a mature entomologist who does not regret that his own training is so conspicuously deficient in certain fundamental things in which he should have been trained as a student. This does not refer necessarily to those fields that have become important recently as a consequence of evolution of the profession, but to those subjects which should have constituted logically a part of his education at the time he was a student. Breadth of training not only in entomology *per se*, but also in related fields basic to or closely correlated with such professional training are especially urgent for the potential entomological investigator.

This is not the place nor the time to present anything that pretends to be a complete or definite curriculum for students who desire to qualify as professional entomologists. Obviously such a curriculum can be erected only from intense and exhaustive study and should be the product of a carefully selected group of experienced teachers. However, it is clear that the difference between undergraduate and graduate instruction should be clearly defined and understood. No thoughtful modern entomologist would endorse the idea that undergraduate training

alone qualifies a student as a professional entomologist. The master's degree has long been, and still is, a perplexing problem to the educator; but we are probably justified in assuming that it satisfies some need in entomological training. It is an irrefutable fact that modern professional demands are such that it is extremely difficult and probably will soon become impossible for the young man or woman to attain full professional status in entomology without first achieving the degree of Doctor of Philosophy or its equivalent. From these facts one may justifiably accept some such concept as the following relative to entomological education. The undergraduate curriculum may well be considered a pre-professional course, *i. e.* a pre-entomological course, in which the student is afforded the opportunity to acquire adequate preparation for instruction at the graduate level and, at the same time, the cultural education that should be demanded of every graduate of a reputable college or university. As indicated above, the master's degree is something of an enigma but might be considered a legitimate and creditable attainment for the student who intends to enter regulatory work or to fill some commercial or industrial entomological niche at a sub-professional level. The graduate training directed toward earning the doctorate must be intensive work of a very high scholastic character, fulfilling truly professional criteria. Such a philosophy of instruction demands a carefully planned progressive and coordinated program with a clear understanding of the distinction between the pre-professional character of the undergraduate curriculum and the professional stature of the graduate studies.

As previously indicated, no attempt is being made in the present discussion to erect curricula for professional training in entomology; but certain salient and fundamental points may well be mentioned briefly. Manifestly, the student requires as much and as thorough training in entomology as possible. However, the usual tendency to compress the greater part, if not all of this, into the undergraduate years should be avoided. Instead thereof, these courses should be logically and progressively correlated and arranged to extend throughout the four years of pre-professional training and well into the graduate years of study, leaving ample time for the undergraduate student to take adequate course work in allied scientific subjects and necessary and desirable cultural courses. Such a recommendation immediately

raises the problem of the student who decides relatively late in his undergraduate course to enter professionally the field of entomology. There is only one rational and ethical answer to this problem and that is to insist that such students fulfill completely the established requirements regardless of the fact that they may be penalized in many instances by the necessity of devoting one or more additional years to the attainment of a bachelor's degree. Failure to adhere to such rigid requirements and definite program can result only in the lowering of the professional standards. The older professions of medicine, law, and chemistry have long ago recognized the necessity and wisdom of such an attitude.

During the undergraduate years the student should receive thoroughly adequate training in zoölogy and botany and in physics and chemistry. However, if studies of the development of the entomological curriculum so indicate, the more advanced required courses in chemistry might be extended into the graduate training. Genetics, plant pathology and plant physiology should be required of the pre-professional student. One of the greatest crimes being committed in entomological education today is permitting the very frequent occurrence of postponement of studying French and German until the student has matriculated in the graduate school. The usual result of this is that the student learns barely enough of these languages to satisfy a lenient examiner and never is able to read French and German accurately and easily. Certainly every student who intends to become a professional entomologist should be required to become competent in reading these languages before begininng graduate studies. The entomological investigator has urgent need of at least a working knowledge of statistical analysis. Consequently mathematics through statistical analysis should be required; if necessary to prevent the overcrowding of the undergraduate curriculum, the advanced work may be covered during graduate instruction. Elementary economics, at least, might well be required of the student in entomology and competency in English should be demonstrated before admission to graduate standing. Most educators recognize and deplore the astounding ignorance of the fundamentals of the English language manifested by a considerable proportion of graduate students in entomology. Undeniably the professional entomologist who is unable to speak and write well and accurately is severely handicapped. In addition to the subjects previously mentioned, the undergrad-

uate student should have as broad a training as at all feasible in the social sceinces and the humanities and thereby enjoy the dignity and prestige of the educated man, an inescapable responsibility of every reputable college and university regardless of the specialized curriculum of the individual student. To insure the discharge of this responsibility and the consequent dignity of the entomological profession, the departments of entomology might very well arrange these cultural subjects into logical groups and require each student to satisfy certain minimum requirements in each group. Admittedly such a schedule would curtail the students' usual freedom of choice in the matter of electives, but is such a restriction undesirable? It can be strongly argued that closer direction of the undergraduate's selection of elective subjects is highly desirable because of his own necessarily limited ability to evaluate courses and to appreciate problems of subject correlations and the necessity of broad professional and cultural perspectives. Furthermore, closer regulation of electives will result in the student profiting more from the considered judgment of the mature scholar.

Some will wonder, and even challenge, why courses in agriculture *per se* are omitted from the general consideration of an entomological curriculum as presented above. The most important reason for this omission is that an entirely adequate program for the training of students in entomology up to the truly professional level does not permit, in the space of seven or eight years of college study, the inclusion of much in the way of strictly agricultural subjects without sacrificing other courses of urgent and greater importance to entomology as a distinct profession. Another reason for this point of view is that agricultural practices are constantly developing and changing and what the student learns in college of these things is frequently out-dated within a period of very few years; such a condition does not justify overcrowding or infringing upon an already heavily burdened and exacting curriculum. Finally, the actual need of courses in agriculture is questionable since experience has shown that the fundamentals and the practical details necessary to the entomologist in his investigations in agricultural entomology and his recommendations for insect control are easily and quickly acquired in the course of early professional duties through conferences with and advice of cooperating agricultural specialists.

Thus far no mention has been made of the graduate student's

research and dissertation. It is sufficient here to point out that the fundamental purpose of this aspect of graduate requirements is to acquaint the student, on a broad plane, with research methods and to afford him an opportunity to demonstrate his ability to organize and conduct research and to properly and adequately handle the results obtained from such investigations. If the teacher recognizes the implications contained in such a concept of the dissertation, he will immediately appreciate the serious thought that must be given to the selection of a research problem for the graduate student and the careful and discreet guidance that he must give to the student. Too frequently, the research problem is either carelessly or thoughtlessly chosen or is selected to further the professor's own research, either of which should disqualify the professor for the privilege and responsibility of directing graduate students.

The problems presented in this discussion are urgent and of major importance if the scholarly and scientific heritage of the field of entomology is to be preserved and is to serve as a source of inspiration to future entomologists as it has been to those of the recent past and if entomology is to deserve the dignity of a professional status.

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## TWO COLEOPTERA RECENTLY ESTABLISHED IN SOUTHERN CALIFORNIA

*Conoderus laurentii* (Guer.) This West Indian elater was accidentally introduced into Florida and Alabama at least forty years ago and is now well established there. On August 2, 1938, I received a specimen of the same from E. Herald, taken on his lawn in Los Angeles and on October 15, 1944, another specimen collected by Mrs. Barbara Prendergast, at Hollywood. According to Prof. Ralph H. Smith, this species is now fairly well established in lawns in various places in southern California.

*Staphylinus* (*Goerius*) *olens* Müll. A common European species, generally listed as *Ocypus olens* Müll. in most insect works, was first noticed at Hollywood, April 16, 1936, and West Los Angeles in November, 1940, and more recently found in abundance in various places near the Campus of the University of California at Westwood, Los Angeles, according to Prof. R. H. Smith. These are, I believe, the first records for this species in this country. Fortunately it is a beneficial insect.—EDWIN C. VAN DYKE.

# A NEW MUSCOID PARASITE REARED FROM BEETLES IN CALIFORNIA[1]

(Diptera)

BY H. J. REINHARD
*College Station, Texas*

The species described below is an interesting addition to the list of *Sarcophaga* forms whose biologic relationships with beetle hosts have been definitely established through rearings. I am indebted to Dr. E. Gorton Linsley for the privilege of studying the present material, all reared from *Thyce sanfordi* Casey. Types of the new species are deposited in the California Academy of Sciences collection.

## Sarcophaga thyceae Reinhard, new species

Related to *S.* (*Acanthodotheca*) *prohibita* Aldrich, but at once distinguished by the much wider front, larger palpi, presence of orbitals and outer verticals in the female; also, there are well marked genitalic differences in both sexes.

*Female.* Front at vertex 0.32 of head width (average of four specimens, 0.33; 0.31; 0.30; 0.32), widening but slightly toward antennal base; parafrontals and parafacials usually silvery gray, latter with one or more rows of black hairs on outer margin extending to lower extremity; frontal vitta black, much wider than parafrontal on entire length; inner and outer verticals well developed, erect; proclinate orbitals two pairs; ocellars moderately large; frontal rows strongly divergent beneath base of antennae and extending to or below middle of second segment; epistoma short, equal clypeal width and slightly bowed forward from plane of same; vibrissae stout, on oral margin; facial ridges bearing a few bristly hairs on lower extremity; antennae mostly black, third segment barely twice length of second and reaching almost to oral margin; arista longer than antenna, long plumose to middle or slightly beyond; cheek gray pollinose, nearly two-fifths eye height; palpi yellow, slender nearly to middle thence strongly swollen and tapering apically to pointed tip; proboscis short; back of head gray pollinose, moderately clothed with pale pile and two rows of black bristly hairs above.

Thorax gray pollinose with the usual 3-5 black dorsal vittae. Chaetotaxy: acrostical 3,1 (rather weak except prescutellar pair);

[1] Contribution No. 873, Division of Entomology, Texas Agricultural Experiment Station.

dorsocentral 3,3; intraalar 3 (front small); posthumeral 1; humeral 3; notopleural 4; postalar 2; sternopleural 3; scutellum with 2 lateral, 0 apical and 1 preapical pair; prosternum bare; sides of postnotum beneath calypters setose; propleura usually bare but sometimes with a few setae on anterior edge; calypters opaque, white.

Abdomen slightly elongated, black, gray pollinose and strongly tessellated above with a constant median black vitta extending almost to hind margin of fourth segment, which is reddish in ground color; all dorsal bristles reduced in size to weak or barely differentiated bristly hairs; one median marginal pair on third segment and a marginal row on fourth; genitalia red; first segment bare and shiny above, transversely grooved shortly before hind margin and more deeply so at sides, the latter somewhat swollen or inflated between groove and basal margin, hind edge of segment with a fringe of fine black hairs; anal orifice rather large and strongly arched above; larvipositor retracted, blunt-tipped, with the lateral apical lobes clothed with short black hairs.

Legs black, moderately stout; mid tibia with two bristles on outer front side near middle; claws and pulvilli normal in size.

Wings gray hyaline; first vein bare, third setulose halfway or more to small cross vein; first posterior cell open well before wing tip; costal spine nearly one-half length of small cross vein; epaulet black, subepaulet pale yellow.

*Male.* Front at vertex 0.22 of head width (average of four specimens, 0.21; 0.22; 0.23; 0.23), narrowed before triangle thence widening rapidly to antennae; parafrontals and parafacials silvery with a decided yellow tinge; orbitals and outer verticals absent; palpi ordinary in size and but slightly thickened apically; cheek about one-third eye height. Thoracic chaetotaxy as in female but good-sized decussate apical scutellars present and the bristles on abdomen normal in size; third segment bearing a median marginal pair and a marginal row of 8 to 10 on anal segment. Hypopygium reddish yellow; first segment dusted with pollen and slightly infuscated dorsally, with about 8 slender bristles on hind margin; second segment subglobose, clothed with longish erect black hairs on entire shiny surface above; forceps moderately long, dark brown, in profile rather thin and gently bowed, beset with minute stubby spines apically on hind side; in rear view the forceps are flat and rather broad, divided except at base but not divergent, with apex of each prong obliquely narrowed outwardly; penis with a rather short yellowish basal segment; second segment longer, shiny brown, convex behind and widened distally with each lateral extremity terminating in a minute bowed hook, the apex between latter broadly and deeply emarginate bearing a pair of recurved divergent hooks on hind side and a rather large subquadrate lobe in front, latter flattened or slightly concave on apical surface with the ventral edge terminating in a curved lip, which bears a small roundish transparent flap on either side; claspers tapered to

pointed curved tips, hind pair moderately long, front ones short with broad base bearing several long hairs on hind side; accessory plate longer than wide, narrowed tip with sparse long hairs; lobes of fifth sternite thickly covered with black spiny hairs and each bearing a shiny concave pad on inner margin near base. Middle femur with comb; hind tibiae not villous; claws and pulvilli longer than last tarsal segment.

**Length, 8.5 - 11 mm.**

*Holotype* female (No. 5443, Mus. Calif. Acad. Sci., Ent.), and *allotype* male (No. 5444), San Jose, California, July 25, 1941, and August 1, 1942, reared from *Thyce sanfordi* Csy. (E. G. Linsley and L. M. Smith). *Paratypes*: 4 males and 8 females, same data as type.

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## Autographa egena (Guen.) a Periodic Pest of Beans in California

*Autographa egena* (Guen.) (Lepidoptera: Phalaenidae) was observed during October, 1943, at Salinas, Monterey County, California, where the caterpillars fed on the leaves and green pods and seeds of beans, especially the pole types. In certain instances the damage was so severe that almost complete defoliation of the plants resulted. During July, 1936, a previous outbreak of this insect was noted at Half Moon Bay, California, at which time the caterpillars damaged a white Kentucky Wonder pole bean. At Salinas the larvae pupated during November, rolling the leaves and transforming within a silken cocoon. Adults emerged in December, 1943, and again in May, 1944. Several generations occur during a single year. Four parasites of the larvae were found. A count made of caterpillars collected during August, 1943, indicated the relative per cent of parasitism as follows: *Copidosoma* probably *truncatellum* (Dalm.) (det. A. B. Gahan), 14 per cent; "*Amblyteles*" *montanus* (Cr.) (det. H. K. Townes), 1 per cent; "*Ephialtes*" *sanguineipes* (Cr.) (det. H. K. Townes), 1 per cent; and *Chaetogaedia monticola* (Big.) (det. M. T. James), 3 per cent. In addition to these parasites a fungus killed 2 per cent of the larvae and 2 per cent failed to emerge for unknown reasons. The adult moth was kindly determined by Carl Heinrich.—W. Harry Lange, Jr.

# NOTES ON THE GENUS THAUMAINA
(Lepidoptera: Lycaenidae)

BY R. G. WIND[1] AND H. K. CLENCH[2]

The monotypic genus *Thaumaina* was erected in 1908 by G. T. Bethune-Baker for the new species described under the name *uranothauma*. It is a very distinct genus, bearing a pattern relationship to the genus *Uranothauma* Butler (P. Z. S. 1895, p. 631), hence the specific name. It remains one of the peculiar developments of the vast island of New Guinea.

## Genus THAUMAINA Bethune-Baker

Bethune-Baker, 1908, P. Z. S. 1908, p. 116. Genotype. *Thaumaina uranothauma* B.-B.

The single species thus far known appears to be restricted to eastern New Guinea, where it is broken up into two races, one of which is described herein as new. It is evidently a highland butterfly, and does not appear to be very common.

The typical form was described (*loc. cit.* and pl. 9, figs. 8, 9) from the Angabunga River, a tributary of the St. Joseph River, which empties on the south coast of eastern New Guinea. On the opposite side of the Owen Stanley Mountains occurs a race of this species. Karl Jordan (1930, Proc. Ent. Soc. London, 5:60, pl. 3, f. 10) has figured a female of this subspecies that agrees well with the allotype described below. This specimen originated on the Edie River, west side of Herzog Mountains, eastern New Guinea. Two males were taken with it, but were not figured.

## Thaumaina uranothauma deliciosa Wind and Clench, new subspecies

*Thaumaina uranothauma*: Jordan, *loc. cit.*

*Upperside*:

*Male. Fore wing* blackish brown with a bright purplish blue patch in the base, from inner margin up to include the lower half of the cell, and extending two-thirds outwards on inner margin. *Hind wing* with the outer half (nearly two-thirds the area) of the wing brownish black. Costa inside white, darker outwardly. Re-

[1] Berkeley, California.
[2] Cambridge, Massachusetts.

maining portion of the wing (save for a narrow inner marginal border) purplish blue. *Fringe* of both wings black and white checked.

*Female. Fore wing* similar to that of the male, but with the blue changed to white and a little more extensive, and with a dark bar extending down over the cell-end from the costa. *Hind wing* with a broad (outer third of the wing) black-brown border. The remaining area is white with pale blue scaling over the inner marginal part. Extreme base black-brown. Veins in the white area lightly scaled with black-brown. *Fringe* as in the male.

*Underside*:

*Male. Fore wing* with the ground color white. A dark tan scalloped marginal border, behind which is a row of alternately dislocated hollow quadrate spots. This row extends from costa to $Cu_2$, while the marginal border proceeds all the way to the inner margin. In the $M_3$-$Cu_1$ and $Cu_1$-$Cu_2$ interspaces the border and row of spots touch. On the costa is a triangular, black-brown spot, its apex narrowly produced to cover the cell-end. In the base is a long bar, parallel to the costa, and with a connection to it at its outer extremity. *Hind wing* with the dark tan scalloped border as in the fore wing, but with the $Cu_1$-$Cu_2$ lunule enclosing a black spot. In the $M_1$-$Cu_1$ interspace is a series of connected, jet-black spots, touching the marginal border. In the interspaces from $Cu_1$ to the inner margin are three more heavy spots, decreasing towards the latter in depth. Base of wing with an irregular black spot. A black, heavy dash, faintly white within, closes the cell. On the costa, almost on the outer angle, is a hollow, nearly circular spot, and one-third from the base is a couplet of similar, though smaller, spots. These markings are all crowded, and almost all appear quite confluent.

*Female.* Similar to the male, save that the post-discal row of spots on the fore wing is larger and more confluent, and as a consequence, less dislocated.

*Length of fore wing*: Male and female, 11.5 mm.

*Holotype* male, WAU, MOROBE DISTRICT, NEW GUINEA, January 30, 1933 (H. Stevens). *Allotype*, female, MT. MISIN, 6400 FEET, MOROBE DISTRICT, NEW GUINEA, May 2, 1932 (H. Stevens). *Paratypes*, two males, same locality and date.

Holotype and allotype in the Museum of Comparative Zoölogy. One paratype in collection of each author.

*Remarks.* This subspecies appears to differ in a number of respects from the description and figure of Bethune-Baker. The black border of the male appears a little heavier on the fore wing, and even more so on the hind wing. On the latter there is no indication of the white spot mentioned and illustrated by him. In the female there are no white spots in the dark border

of the fore wing (two were described, and both show up well in the figure), and the cell is closed by a dark streak running from the costa, absent in the description and figure of the typical subspecies. In the hind wing the pale blue scaling of *deliciosa* is not mentioned by Bethune-Baker, or depicted in his figure. The underside appears to be similar, but perhaps with the spots slightly larger.

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## ON THREE SPECIES OF AGABUS RECORDED FROM THE STATE OF MONTANA[1]

(Coleoptera, Dytiscidae)

BY HUGH B. LEECH
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The inclusion of *Agabus confertus* Le Conte (det. H. C. Fall) in Mank's list of the Coleoptera of Glacier Park (1934, p. 75) was for some years a puzzle to me, as all specimens I had seen were from much nearer the coast. Through the kindness of Miss Mank I examined both Montana specimens on May 3, 1939, and found them to be *Agabus erichsonii* G. & H., a species of similar facies. *A. confertus* may yet be found in Montana for I have seen one taken at Boise, Idaho, June 15, 1941, by Borys Malkin.

In September 1941, Dr. Harlow B. Mills was so kind as to allow me to examine certain of the Agabus reported upon by Hatch (1933, p. 10). The *A. seriatus* (Say) of Hatch are all the subspecies *intersectus* (Crotch) of Leech 1942. The series of "*obliteratus* Lec." proved to be composite; two of the specimens from Bozeman are *strigulosus* (Crotch); the others, as well as those from Shields River and Bitter Root Valley are *A. nectris* Leech.

### References

Hatch, Melville H., 1933, Records of Coleoptera from Montana, Canad. Ent. 65(1):5-15.

Leech, Hugh B., 1942, New or insufficiently known Nearctic species and subspecies of Agabus (Coleoptera, Dytiscidae), Canad. Ent. 74(7):125-136, 1 pl. (=p. 127).

Mank, Edith W., 1934, The Coleoptera of Glacier Park, Montana, Canad. Ent., 66(4):73-81.

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[1] Contribution No. 2322, Division of Entomology, Science Service Department of Agriculture, Ottawa, Ontario.

# A NEW JAVANESE OROCHLESIS AND A CHECKLIST OF THE GENUS

(Coleoptera, Curculionidae)

BY ELWOOD C. ZIMMERMAN
*Bernice P. Bishop Museum, Honolulu*

Among some specimens of insects collected in Java by Mrs. M. E. Walsh, there is a pair of weevils which represent a distinct new species of the cryptorhynchine genus *Orochlesis* Pascoe, 1871. There have been no *Orochlesis* reported from Java heretofore, and this paper is written principally to record the additional geographical data supplied by the new species.

With the description of another new species, the number of known *Orochlesis* is raised to 24. A new checklist of the described species of the genus, arranged by locality from east to west, follows:

1. **Orochlesis lunata** Zimmerman, 1936, Occasional Papers Bishop Museum, 12(1):5, figs. 1, a, c; 2, a; 3, f. 1936, same journal, 12(23):47.
   Tahiti, Society Islands.
2. **Orochlesis gibbera** Zimmerman, 1936, same journal, 12(1):7, figs. 1, b(1); 2, b; 3, e. 1936, same journal, 12(23):47.
   Raiatea, Society Islands.
3. **Orochlesis nigrofasciata** Marshall, 1921, Proc. Hawaiian Ent. Soc., 4(3):593.
   Samoa.
4. **Orochlesis vitticollis** Zimmerman, 1936, Occasional Papers Bishop Museum, 12(1):9, figs. 2, d; 3, c. 1936, same journal, 12(22):6.
   Viti Levu, Fiji.
5. **Orochlesis bryani** Zimmerman, 1936, same journal, 12(1):11, figs. 2, e; 3, b. 1936, same journal, 12(22):6.
   Viti Levu; Taveuni, Fiji.
6. **Orochlesis nigra** Zimmerman, 1936, same journal, 12(1):12, figs. 2, f; 3, a. 1936, same journal, 12(22):8, fig. 1, d.
   Viti Levu, Fiji.
7. **Orochlesis angulata** Zimmerman, 1936, same journal, 12(22):4, fig. 1, b.
   Viti Levu, Fiji.
8. **Orochlesis bella** Zimmerman, 1936, same reference, p. 5, fig. 1, a.
   Vanua Levu, Fiji.

9. **Orochlesis eluta** Zimmerman, 1936, same reference, p. 7, fig. 1, e.
"Fiji".
10. **Orochlesis tessellata** Zimmerman, 1936, same reference, p. 8, fig. 1, c.
Ovalau, Fiji.
11. **Orochlesis ater** Zimmerman, 1939, Pan-Pac. Ent., 15(2):57.
Viti Levu; Taveuni, Fiji.
12. **Orochlesis conspersa** Zimmerman, 1938, Proc. Hawaiian Ent. Soc., 10(1):165.
"Solomon Islands".
13. **Orochlesis posticalis** (Lea) Lea, 1913, Trans. Royal Soc. South Austr., 37:327.
*Queenslandica posticalis* Lea, 1903, Proc. Linn. Soc. New South Wales, 28:665. Zimmerman, 1936, Occasional Papers Bishop Museum, 12(1):13.
Queensland, Australia.
14. **Orochlesis delta** Lea, 1913, Trans. Royal Soc. South Austr., 37:328. Zimmerman, 1936, Occasional Papers Bishop Museum, 12(1):13.
Queensland, Australia.
15. **Orochlesis personata** (Pascoe) Lea, 1913, Trans. Royal Soc. South Austr., 37:328.
*Acacallis personata* Pascoe, 1883, Ann. Mag. Nat. Hist., (5)12:96.
*Queenslandica munda* Lea, 1903, Proc. Linn. Soc. New South Wales, 28:666. Zimmerman, 1936, Occasional Papers Bishop Museum, 12(1):14.
Queensland, Australia.
16. **Orochlesis cornuta** Zimmerman, 1936, same reference, p. 14, figs. 1, b; 2, c; 2, d.
Queensland, Australia.
17. **Orochlesis flesina** Pascoe, 1871, Jour. Linn. Soc. London, Zool., 11:195. Zimmerman, 1936, Occasional Papers Bishop Museum, 12:17.
Aru Islands (south of Papua).
18. **Orochlesis maculosa** Pascoe, 1874, Jour. Linn. Soc. London, Zool., 12:40. Zimmerman, 1936, Occasional Papers Bishop Museum, 12(1):17.
Salwatty Island (off the western tip of New Guinea).
19. **Orochlesis solea** Pascoe, 1871, Jour. Linn. Soc. London, Zool., 11:195. Marshall, 1921, Proc. Hawaiian Ent. Soc., 4(3):593-594. Zimmerman, 1936, Occasional Papers Bishop Museum, 12(1):17.
Batchian, Moluccas.
20. **Orochlesis annularis** Pascoe, 1871, Jour. Linn. Soc. London, Zool., 11:194, pl. 8, figs. 2, 2a. Lea, 1913, Trans. Royal Soc. South Austr., 37:327. Zimmerman, 1936, Occasional Papers Bishop Museum, 12(1):17.

New Guinea; Yule Island (Gulf of Papua); Dorey and Batchian Islands, Moluccas; Makassar, Celebes; Luzon, Philippines; Penang Island, Malacca Straits.

21. **Orochlesis picticollis** Zimmerman, new species.
Java.

22. **Orochlesis anteplagiata** Heller, 1934, Wiener Ent. Zeit., 48:104. Zimmerman, 1936, Occasional Papers Bishop Museum, 12(1):18.
Formosa.

23. **Orochlesis takaosanus** Kôno, 1932, Insecta Matsumurana, 6(4):178, pl. 6, fig. 8. Zimmerman, 1936, Occasional Papers Bishop Museum, 12(1):18.
Honshu, Japan.

24. **Orochlesis meshimensis** Kôno, 1937, Insecta Matsumurana, 11:129.
Meshima (Danjo), Japan.

## Orochlesis picticollis Zimmerman, new species (figs. 1-3)

*Color*: derm piceous to shiny black; scaling very dense, mostly completely or almost completely concealing derm, ground color basically mouse-gray, the scales mostly with a slight, but distinct, iridescence; head and base of rostrum with brown scales with paler patches on either side of median line at base and at inner dorsal parts of eyes; pronotum with disk largely occupied by a large, conspicuous, subcircular, variable patch of dark brown or velvety black scales extending from base to beyond subapical constriction, in its emphasized form very prominent and strongly contrasting with the paler background scaling, scaling on sides from above coxae to dorso-lateral margins more brownish than on dorsum; elytra almost uniformly mouse-gray with a yellowish brown cast without any distinct maculae, setae darker than background; leg scaling similar in color to that of sides of pronotum and elytra, not spotted nor banded; scales on sternum and first two abdominal segments pale yellowish brown, those on ventrite 2 mostly slightly darker than those on metasternum; ventrites 3, 4 and 5 with a conspicuous patch of dense pale yellowish brown scales on either side, but with dark scales elsewhere.

*Head* with derm completely concealed by squamae, the scales large, mostly directed dorsad; with stout, erect, clavate setae along inner margins of eyes and on either side of median line of crown; most scales on interocular area and anterior part of crown slanting, slightly sub-erect; narrowest part of interocular area slightly narrower than base of rostrum; crown slightly flattened (best seen when viewed from side).

*Rostrum* only slightly arcuate, almost straight in female; densely squamose at base in female, to middle in male; closely punctate and finely reticulate to beyond basal scaling in female, but with denser punctures and coarsely reticulate in male.

*Antennae* (described from left antenna removed from female) with the sinuous, clavate scape about as long as funicular segments 1-4 inclusive, about as broad at its widest part as funicular segment 7; funiculus with segment 1 nearly as long as 2 plus 3, segment 2 not quite as long as three following segments together, segments 3 to 7 successively broader; club almost as long as funicular segments 3 to 7 inclusive.

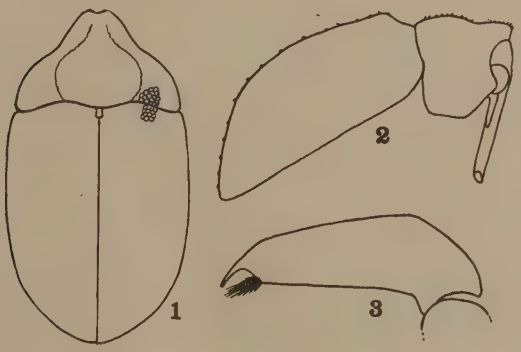
*Pronotum* broadest near base, about two-fifths or one-third broader than long (measurements of specimens described as follows: male, 48 units wide to 33 long; female, 57 units wide to 37 long); base sinuate; strongly arcuate on sides from base to beyond middle and then strongly constricted, thence pointedly narrowed to apex; the constriction broadly and deeply continued across dorsum; distance across dorsum at transverse constriction about one-half basal breadth; longitudinal dorsal contour with area behind transverse depression on a higher plane than area in front of depression; extreme apex (viewed from side) thick, about one-half as thick as breadth of a fore tibia; the closely punctate derm completely concealed by very dense, unusually large, broad, fan-shaped, strongly imbricated, anteriorly directed scales; most scales in dark discal macula erect or sub-erect; with stout, erect, clavate setae in the dark discal macula, along either side of median line beyond transverse depression to apex, more numerous on either side of apex where the scales and setae produce the margin into a blunt point on either side of apex, scattered along lateroapical margin back to lateral constriction, and with a slightly condensed group of setae tending to form a feeble fascicle mesad of the true lateral margin at hind margin of transverse constriction, and with scattered setae from there to base.

*Scutellum* subquadrate or subrectangular, bare, coarsely reticulate, dull.

*Elytra* about two-thirds as broad as long, slightly more than two and one-half times as long as pronotum (measured from side from humeri to apex); base distinctly sinuate, only as broad at humeri as base of prothorax, broadest behind middle, and there but hardly broader than base, almost straight on sides to beyond middle; longitudinal dorsal contour rising abruptly from shortly behind base to reach a distinctly higher elevation than that of base of pronotum; derm completely concealed by dense scaling similar to that on pronotum, but with a few polished, setiferous granules showing through in basal third of interval 1 or less distinctly on intervals 3 and 5 also; alternate intervals slightly more convex than even-numbered ones, and each odd-numbered interval bearing a row of slanting, stout, clavate setae; interval 1 with a low subbasal callosity on which the setae and granules are more abundant, intervals 3 and 5 with a tendency toward having less conspicuous subbasal callosities (none of the callosities are outstanding and those on the fifth intervals may be indistinct or ob-

solete); striae showing narrowly through the scaling, punctures indicated through the scaling, but none completely exposed.

*Legs* all densely clothed with large, imbricated scales which conceal derm; femora and tibiae with stout, clavate, scattered setae which are most abundant along dorsal edges; anterior femora with a sharp carina extending almost entire length of ventral sulcus thus dividing it into subequal parts, with a few scales on outer side of carina, other femora deeply sulcate from base to apex but without any such carinae; tibiae broad, greatest breadth of hind pair one-third of greatest length excluding uncus, greatly compressed, outer margins knife-edged but squamose, carinate only along either side of inner edge, inner edge straight, outer edge arcuate, that of hind pair subangulate, with a patch of black setae on outer side at base of the strong unci, conspicuous on two posterior pairs




EXPLANATION OF FIGURES

Fig. 1, lateral outlines of *Orochlesis picticollis* Zimmerman with dark prothoracic macula and type of squamae indicated. Fig. 2, contours of head, prothorax and elytra from side. Fig. 3, outlines of a hind tibia. (Drawings from female allotype.)

of tibiae but less conspicuous on anterior pair, the long yellow setae arising from inner apical angle extending to apex of uncus; tarsi with numerous, slender setae and setiform squamae, anterior pair with segment 1 as long as 2 plus one-half of 3, 2 about as long as median length of 3, 3 about one-third broader than long and as broad as 1, about as long as 1.

*Sternum* with mesosternal receptacle strongly protuberant, extended to a level slightly ventrad of that of mesocoxae, its outer walls densely clothed with large squamae, hind wall from metasternum to aperture about one-half as long as median line of metasternum, aperture about on a line with anterior edges of meso-

coxae; all coxae densely squamose; metasternum flattened in female, concave in male, densely clothed with very large, broad, partially imbricated, ovate scales, which almost entirely conceal the derm, with large, deep, angular, bare fovea situated on caudal one-third of median line, posterior margin broadly emarginate, shortest distance between mid and hind coxae about seven-tenths as long as longitudinal chord of a mesocoxa or about as long as ventrite 5; pleura densely squamose.

*Abdomen* with ventrite 1 broadly concave in both sexes, but with longitudinal contour less even in female, coarsely reticulate, the punctures on disk bearing very large, rounded or subcordate scales which conceal most of the derm but are mostly not imbricated, most scales just touching or narrowly separated from their neighbors, scales much smaller at sides where femora contact the ventrite, length along median line about as long as ventrites 2 plus 3, hind margin broadly emarginate from sides to middle; ventrite 2 as long as ventrite 3 plus 4 plus about one-half of 5, clothed with large scales similar to those on ventrite 1, but denser and with more scales overlapping; ventrites 3 and 4 with slender, anteriorly directed setae along anterior edge, with a very dense patch of large, erect or sub-erect, imbricated, pale scales at each end and the space between with erect but strongly and conspicuously recurved dark scales in one or partially two rows; ventrite 5 with vestiture similar to that on 3 and 4 but with entire disk filled with the dark erect squamae.

Length: 5.5-6.25 mm.; breadth: 2.75-3.5 mm.

*Holotype* male and *allotype* female collected by Mrs. M. E. Walsh at MANDDALAWANGI, MT. GEDA, WEST JAVA, elevation 4,000 feet, May, 1939; in the type collection of Bishop Museum.

This species is not closely allied to any of the other species of the genus known to me. The large black prothoracic macula is broken down in the male holotype, but it is very conspicuous in the female allotype on which it somewhat resembles a broad black tear-drop. It is almost circular in form, but the anterior part is extended forward to make a tear-drop or inverted sub-heart-shaped macula. The setae on the alternate elytral intervals appear as rows of small black dots to the unaided eyes. The scales are unusually large and dense overall.

# SYNOPTIC REVIEW OF THE KNOWN SPECIES OF CRYPTOGLOSSA SOLIER, WITH DESCRIPTION OF A NEW SUBSPECIES

(Coleoptera: Tenebrionidae)

BY FRANK E. BLAISDELL, SR.
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The species under consideration, inhabit the arid areas of the Sonoran Region of the south-western United States, northern Mexico and Lower California. They are as follows:

## Genus CRYPTOGLOSSA Solier

*Asbolus* LeConte, 1851, Annals Lyc., N. Y., p. 129.
*Cryptoglossa* Solier, 1836, Soc. Ent. Fr., 5, p. 680; Lacordaire, 1859, Genera Coleopt., 5, p. 135; Horn, 1870, Revis. Tenebr., Amer. Philos. Soc., 14, p. 278 and 280; LeConte and Horn, 1883, Class. Coleopt. N. Amer. (Smiths. Miscel. Coll. 507), p. 368.

Head large and deflexed, epistomal apex scarcely truncate to feebly arcuate Mentum large and rounded, apex slightly emarginate at middle; buccal fissure wide, palpi not dilated. Antennae strongly compressed, eleventh segment short and transverse, slightly received into the tenth. Prosternum produced posteriorly, broad and rounded at apex. Legs stout, tarsi clothed with long ferruginous setae beneath; first segment of the posterior tarsi longest.

### CRYPTOGLOSSA BICOSTATA SOLIER

*Zopherus bicostatus* Solier, Dupont collection (Pl. 24, figs. 11-13).
*Cryptoglossa bicostata* Solier, 1836, Ann. Soc. Ent. Fr., 5, p. 681, t. 24, f. 11-13; Cast. Hist. Nat. II, 1840, p. 191.

A Mexican species described from a unique specimen, resembling the common Sonoran species (*verrucosa* Lec.) in form and tuberculate elytra, except that the fifth interval of each elytron is convex, more or less prominent and costate from the elytral base to about posterior third of the length (fig. 13), and there changing to tubercles. In the type and only known specimen, the distal segments of both antennae are missing, the character of the eleventh or terminal segment being unknown. This fact leaves the correctness of the determination open to doubt.

In *Cryptoglossa* the eleventh antennal segment is short, transverse and more or less sunken into the tenth segment.

The author considers it absolutely necessary to present facts and to leave the final decision to future students, when other specimens shall have been collected.

*Habitat.* Mexico. Type a unique, length 27 mm.; width 11 mm.

### CRYPTOGLOSSA VERRUCOSA LECONTE

*Cryptoglossa verrucosa* LeConte, 1851, Ann. Lyc. Nat. Hist., N. Y., 5, p. 129; Lacordaire, 1859, Genera des Coleopt., 5, 1st. pt., p. 138; Horn, 1870, Revis. Tenebr., Trans. Amer. Philos. Soc., 14: p. 280; Blaisdell, 1943, Proc. Calif. Acad. Sci., (4), 24, p. 223, pl. 11, figs. 10 and 17.

A common and moderately large, black, opaque and more or less pruinose species. Pronotum narrower posteriorly than at apex, the latter arcuate and sinuate within the rather large and distinct angles; sides arcuate anteriorly, moderately convergent posteriorly before the basal angles, the latter distinct, scarcely prominent; base truncate to feebly emarginate. Disk extremely and densely, finely granulate, strongly convex, especially anteriorly; impressions well marked, more or less finely canaliculate on the median line, sublateral strong; base transversely impressed.

Scutellum short, triangular and not entering between the elytra. Elytral base applied to the pronotal base; sides arcuate, surface declivous apically, apex subacute. Each elytron has nine series of rather large subarcuate tubercles, the latter obsolete before the apex; surface viewed vertically the tubercles appear irregular and not serial, viewed obliquely and longitudinally from behind they appear in distinct series; more or less variable in size, showing a tendency to become slightly longer than wide at base, toward elytral base they may become smaller, laterally they become rather subacute and the inner or discal appear obliquely elongate to almost subcarinate and most prominent at their apex. The first or sutural interval plane, slightly irregular on surface with scattered very small points.

Measurements: Length 19-20 mm., width 8-10 mm.

Males: Usually smaller and narrower, abdomen moderately convex.

Females: Larger, wider and rather more robust, abdomen more convex.

*Type locality*: "In desertis fluminis Colorado."

*Distribution*: CALIFORNIA. San Diego County, May 15, 1911 E. L. Ricksecker); Mohave and Colorado Deserts (H. C. Fall); Imperial County: La Puerta, August 12; Coachella, May 7, 1917; Salton Sea, April 19, 1916; Indio, March 29, 1924 (L. S. Slevin);

Los Angeles County (Albert Koebele); San Bernardino County: Needles, March 16, 1922 (J. A. Kusche); Barstow, April 13 (J. R. Slevin); Riverside County: Blythe, Nov. 10, 1924 (F. C. Hadden); Palm Springs, May 28, 1916 (J. O. Martin); Kern County: Kings River Canyon (F. Daggett). ARIZONA. Yuma County: Papago Wells, April 16, 1912; Mohave County: Kingman; Pima County: Tucson, Nov., 1921; Santa Catalina Mts., Feb. 5, 1935; N. E. Pima County; S. Pinal County: Picacho, Nov. 10, 1938; S. Arizona. Ajo Mts., Oct. 16, 1935 (Owen Bryant). NEVADA. Charleston Mts. near Las Vegas, May 24, 1935.

Three living specimens were received by the author, April 21, 1933, from a collector in Arizona, two females and a smaller male. The author decided to keep them under observation and on a very restricted diet, rolled oats without water. A glass jar was prepared, by partly filling with sand, covered by a layer of oats.

The smaller female died about the sixth year, without any special record. The male died July, 1939, after having lived in the jar for six and one-half years. For diversion and exercise the specimens spent part of their time, clawing and digging into the oats and sand, evidently trying to develop a burrow. The larger female began to show signs of senility at about the sixth year of its confinement; this was noticeable in its diminished activity, with loss of tarsal segments and the two or three terminal segments of the antennae. For the last weeks it scarcely showed signs of life, and died July 10, 1940. During the last weeks a drop of water was placed before it on the table. It would approach the water and sip it up entirely, without any bad effects. The two specimens are preserved in the collection of the Entomological Laboratory of the California Academy of Sciences.

**Cryptoglossa verrucosa carinulatus** Blaisdell, new subspecies

Form as in *verrucosa* LeConte. Frons convex, very sparsely punctate, punctures small in central area, becoming larger and denser apically and laterally. Sides of head broadly and rather feebly emarginate across the position of the oblique sutures, the latter feebly evident or obsolete; epistoma truncate at apex. Mentum broadly emarginate at apex and somewhat widely margined, surface moderately convex, not sharply nor densely punctate, impunctate at base; gula transversely rugose.

Pronotal disk very densely and finely granulate, a feebly and

slightly impressed median line is present, other impressions quite feeble, except a distinct basal sulcus which does not attain the sides. Prothoracic sides slightly irregular, impunctate or very feebly subpunctate, especially anteriorly. Prosternal process broadly margined at apex, surface impunctate or irregularly punctate with intervals rather wide.

Elytral intervals in the central area carinulate, each carinula not strong, each divided into carinules by fine transverse fissures, each represents a modified tubercle, which can be seen in specimens of *verrucosa* as subcarinal tubercles; these at the beginning of the lateral declivity gradually develop into verrucae, which at first are oblique and angulate posteriorly to form the usual obtuse prominences; sutural intervals plane, finely and sparsely granulate; striae of punctures not distinct; tubercles not sharply defined and broader at base, irregularly involving the intervals.

Sternal and parasternal punctures large, well separated and not sharply defined. Abdominal punctures moderate in size, and sparseness, larger and denser laterally especially on first segment; fifth segment with denser and smaller punctures.

Male. Usually smaller and narrower, elytra less arcuate at the sides.

Female: Broader and subovate, elytra more arcuate at the sides.

*Holotype* male (No. 5408), and *allotype* (No. 5409), Mus. Calif. Acad. Sci. Ent., collected by J. R. Slevin, two miles west of Stovepipe Wells, Death Valley, Inyo County, California, May 15, 1931. *Paratypes*, sixteen, from Furnace Creek, Death Valley, California, collected April 3, 1939, by K. S. Hagen. Albert Koebele secured specimens in Death Valley, April, 1891. J. R. Slevin obtained the species in Panamint Valley, April 29, and also at Balarat, Inyo County, May 13, 1931.

### Cryptoglossa laevis LeConte

*Asbolus laevis* LeConte, Annals Lyc., N. Y., V, 1851, p. 130.
*Cryptoglossa laevis* LeConte, Revis. Tenebr., Amer. Philos. Soc., XIV, 1870, p. 280.

Form similar to that of *verrucosa* Lec., smaller. Black, somewhat shining. Pronotum moderately convex, obscurely punctulate, discal impressions obsolete; base transversely impressed, without marginal bead; lateral marginal bead very fine. Elytra about twice as long as the pronotum, base transverse and slightly wider than the pronotal base; arcuately and rather abruptly declivous at apex; surface obscurely and finely punctulate laterally. Horn states that *laevis* is smooth and shining, elytra entirely so. Eight specimens studied.

Measurements: length 15-20 mm., width 8-10 mm.

*Type* in the LeConte collection, "long. 65."

*Distribution*: CALIFORNIA: Gray's Well, Colorado Desert, Imperial County, Dec. 3, 1927; Westmoreland, Imperial County, May 6, 1933 (E. C. Van Dyke). ARIZONA: Yuma, May, 1905 (Brown Coll.); May 12, 1912 (J. R. Slevin).

### CRYPTOGLOSSA LAEVIS SUBSIMILIS CASEY

Casey, Memoirs on the Coleoptera, XI, 1924, p. 308.

Similar to *laevis* in form and in the absence of sculpture, but considerably larger and rather more elongate. Color deep black, surface shining, smooth and glabrous. Antennae and legs are somewhat longer than in *laevis*. In *subsimilis* the elytra are less smooth, having more numerous feeble striiform lines and stronger punctures toward the sides.

Measurements: length 16.5-18.5 mm., width 8.5-9.0 mm.

*Type* in the Casey collection.

*Distribution*: CALIFORNIA: Gray's Well, Imperial County, July 31, 1940; June, 1911 (E. C. Van Dyke); Westmoreland, Imperial County, May, 1933. ARIZONA: Yuma, March 12, 1912 (J. R. Slevin); May, 1910.

Number of specimens studied, 8; Col. Casey had two specimens when he studied the species. There is some confusion as to which form Casey's description applies. The author considers it best to give Col. Casey the benefit of the doubt as it is merely a subspecies.

### CRYPTOGLOSSA GRANULIFERA CHAMPION

*Cryptoglossa granulifera* Champion, Biol. Centr.-Amer., Col., IV, 1, 1892; Blaisdell, Proc. Calif. Acad. Sci., Vol. XII, No. 12, July 10, 1923, pp. 252-253; Proc. Calif. Acad. Sci. (4) Vol. XXIV, No. 7, February 4, 1943, pp. 223-224.

Color black, more or less dull to slightly shining.

Head widest before the eyes, sides more or less arcuately convergent anteriorly; epistomal sutures obliterated, apex feebly arcuate in middle two-thirds, thence obtusely continuous with the sides; frontal surface slightly convex, punctures more abundant apically, more or less impunctate centrally and toward base. Antennae compressed distally, eleventh segment short and truncate. Mentum rounded in form, closely punctate apically, more or less impunctate before the base; apex feebly emarginate and slightly impressed.

Pronotum slightly wider at base than at apex, about one-third

wider than long; disk moderately and rather evenly convex, feebly transversely impressed at base, surface finely and rather evenly punctulate; sides broadly arcuate anteriorly, becoming slightly sinuate in basal third; apical angles prominent and subacute, the basal rather prominent posteriorly but not laterally and slightly less than rectangular.

Elytra somewhat oval, about a third longer than wide; base equal to width of pronotal base, more or less abruptly and arcuately declivous in apical third; surface with series of moderately small and unimpressed punctures, which become obsolete on the smooth apical declivity, each interval with a series of distantly placed granular elevations, becoming slightly coarser toward the sides, absent apically.

Under surface of body opaque and almost impunctate. Prosternum broadly and horizontally produced between the procoxae, broadly rounded at apex. Mesosternum sharply raised on either side, and excavated at middle for reception of the apex of the intercoxal process.

Measurements: length 18-20 mm., width 8-10 mm.

*Type locality*: Villa Lerdo in Durango, Mexico (Doge.).

Five specimens studied. Allied to *C. mexicana* Champion and *C. laevis* LeConte, differing from both in having a row of distantly placed granular elevations on each of the elytral intervals, the sutural interval smooth and plane. The elytral sculpture is variable, but the granular elevations are always distinct, becoming a little coarser toward the sides.

DISTRIBUTION: Gulf of California: Mejia Island, April 30, 1921; Isle Partida, May 3, and June 26, 1921 (Virgil Owen Coll.). Mexico: Sierra de los Burros, Coahuila, June 18, 1938 (Rollin H. Baker). California: Borrego Canyon, San Diego County, March 22, 1930. Texas: El Paso, June, 1884, and San Antonio.

### CRYPTOGLOSSA ANGULARIS HORN

*Centrioptera angularis* Horn, Proc. Calif. Acad. Sci. (2), Vol. IV, 1894, pp. 414-415, pl. VII, Fig. 4; Blaisdell, Proc. Calif. Acad. Sci. (4), Vol. XXIV, No. 7, February 4, 1943, pp. 223.

From all of the known species *angularis* differs in having the hind angles of the pronotum distinctly everted and the lateral margin in front of them slightly reflexed.

Head similar to that of *granulifera* Champion, but with the frontal margin more evenly arcuate from side to side. Pronotum trapezoidal, broader than long; apical angles acutely prominent anteriorly; sides arcuate, sinuate behind the middle; basal angles acute and moderately everted; disk moderately convex, slightly

impressed along the base, surface very finely and sparsely punctate. Prothorax beneath slightly rugose.

Elytra oval, disk slightly convex to plane, becoming arcuately to somewhat abruptly declivous laterally, obliquely so apically; surface subsulcate, with small distinct murications along the striae, intervals more or less convex, more evidently and coarsely muricate laterally, apical declivity smooth before the apex.

Abdomen very sparsely punctate. Metasternum with few coarse punctures. Legs densely and coarsely punctate.

Measurements: length 20-38 mm., width 10-11.5 mm.

*Type* (No. 109), Museum of the California Academy of Sciences; collected at El Paraiso, Lower California.

*Distribution*: Lower California: Las Paz, July 3, 1919, and Santiago, July 22, 1919 (J. R. Slevin); Catavina, June 19, 1938 (Michelbacher and Ross).

The head is missing in the type. Three specimens at hand show that the eleventh antennal segment is short and transverse, and therefore not a member of the genus *Centrioptera* Mann.

### Cryptoglossa mexicana Champion

*Cryptoglossa mexicana* Champion, 1884, Biol. Centr.-Amer., Vol. IV, Pt. 1, p. 73, Tab. III, fig. 21.

Opaque, black. Head with a few fine scattered punctures along the anterior margin; mentum coarsely and rather closely punctate.

Pronotum moderately convex, widened toward the front; apical angles very prominent and triangular; basal angles a little produced, impunctate. Elytra a little broader than the pronotum at base moderately convex, with rows of shallow rounded impressions which become obsolete behind the middle, a few scattered raised points at base.

Measurements: length 17-19 mm.

*Habitat.* Monclova in Coahuila, Mexico.

Champion stated that he had six specimens when he described the species and according to him it is near *laevis* LeConte: opaque, broader and less convex; thorax broader, wider in front, flatter and less convex, apical angles more produced. Elytra less convex, broader at the base and less rounded at the sides, and with rows of shallow punctures toward base.

# NOTES ON REDWOOD CERAMBYCIDS (COLEOPTERA)

BY J. W. TILDEN
*Santa Cruz, California*

In the winter of 1932-33 I reared a few specimens of cerambycids from Coast Redwood at Santa Cruz, California. Dr. E. C. Van Dyke kindly determined them as his species, *Semanotus ligneus sequoiae* Van Dyke and *Callidium pallidum* Van Dyke. There was also one specimen of *Opsimus quadrilineatus* Mann., a species normally associated with *Pseudotsuga taxifolia* (Lamb.) Dr. Van Dyke urged me to secure more of these insects, and suggested further rearing.

Redwood second growth that had been attacked in the forest by Cerambycidae was stored in wooden boxes indoors in the winter of 1933-34, but with poor results, as only a few specimens were obtained. It was found that mortality at emergence was very high. This may have been due to greater dryness since these insects are normally exposed to very damp weather.

In March, 1935, a second growth redwood about ten inches in diameter was cut down in the woods. It remained exposed to attack all summer, and in the fall was found to be heavily infested with beetle larvae.

In March, 1936, an examination of the tree showed that the beetles had transformed from pupae to adults and were ready to emerge. To prevent normal emergence and loss, they were removed from the tree, so that the normal date of emergence was not obtained. Collection dates of free specimens taken in the same locality range from late February to the middle of April in these same species.

The number of adults removed from this one tree was large: upwards of 70 specimens of *Semanotus ligneus sequoiae*, about 150 of *Callidium pallidum*, and in the upper small branches, a number of specimens of *Phymatodes nitidus* Lec. In addition to these, a few specimens of *Callidium sempervirens* Linsley were taken from the twigs at the tip of the tree.

Larvae of *Temnochila virescens* (Fab.) and a single raphidid larva were found in the burrows of *Semanotus*, while an unidentified fungus killed some pupae; but on the whole these beetles seemed remarkably free from both parasites and predators.

From the available data, the following conclusions are drawn:

1) These cerambycids attack the Coast Redwood and develop in freshly cut or injured wood (especially in second-growth timber or in limbs?). The larvae first feed in the drying cambium and later in the sapwood, but eventually may bore deeply into the wood. They usually return nearly to the surface, just below the bark, to pupate. The species observed develop from egg to adult in one year.
2) They show specific preference for certain parts of the tree. *Semanotus* is found in the main trunk of second-growth trees, *Callidium pallidum* Van Dyke occurs in the branch-bearing part of the trunk and in the larger branches, while *sempervirens* and *Phymatodes nitidus* prefer the smaller branches and trees.
3) These species are less rare than previously supposed, and proved able to build up large populations under optimum conditions such as those afforded by the presence of a freshly cut tree at the time of oviposition.
4) *Opsimus quadrilineatus* Mann., previously associated only with *Pseudotsuga taxifolia* (Lamb.) seems able to utilize *Sequoia sempervirens* (Lamb.) as a food supply.

## FURTHER NOTES ON SOME SPECIES OF ZODION

(Diptera, Conopidae)

Since the publication of notes on the *Zodion fulvifrons* group, the author has visited the museums in the East and has examined many types. As a result, the following changes must be made:

*Zodion reclusum* Banks. The type has some reddish on the sides of the second abdominal segment not mentioned in the original description. There is also much yellowish on the other segments and therefore belongs under *fulvifrons* rather than as a synonym of *intermedium*.

*Sicus brevirostris* Coquillett (1902, Canad. Ent. 34:198—Mexico: Chihuahua: Sierra Madre). This species is a *Zodion*, the second segment of the proboscis noted by the describer being the labellae. The palpi are clubbed, two to two and one-half times the width of the proboscis; and the species does not seem to differ from *palpale*.

*Zodion bimacula* Curran. The type is an individual in which the distal portion of the proboscis is broken off. It is a specimen of *Occemyia loraria* Loew.—SIDNEY CAMRAS.

# NOTES ON SOME MOTHS OF THE FAMILY SATURNIIDAE
(Lepidoptera)

BY J. W. TILDEN
*Santa Cruz, California*

While collecting in the Pozo Mountains in the general region of La Panza, San Luis Obispo County, on March 23, 1940, George Mansfield and the author took three male specimens of a *Calosaturnia* sp.

This area is a typical chaparral association of *Ceanothus, Arctostaphylos, Cercocarpus, Adenostoma, Photinia, Dendromecon,* with *Quercus* spp. in the canyons. The specimens were taken flying in typical undulating fashion over the chaparral on the west side of the divide.

I have been informed by Mr. J. W. Johnson (personal communication) that there exist to his knowledge no previous records of this genus from San Luis Obispo County. Inasmuch as this area is outside of the habitats of his two recently described species of *Calosaturnia, C. albofasciatus* Johnson and *C. meridionalis* Johnson, it appears probable that the specimens from the Pozo Mountains are referable to *Calosaturnia mendocino* (Behrens), the type species of the genus, thus extending the already wide known range of the species.

In July, 1941, six larvae of *C. mendocino* were taken in the Santa Cruz Mountains. All were of the pink or orange color phase, none being of the dark or green phase. Of these, three pupated in typical saturniid cocoons in a few days. Two others succumbed to *Apanteles* parasites, and a sixth disintegrated, possibly from a bacterial disease. Of the three pupae, one emerged in an injured condition on January 17, 1942. About the same time, a second pupa produced a tachinid. The third pupa did not develop either adult or parasite. The food plant of the larvae taken was *Arbutus menziesii* Pursh. Several of our party complained of the stinging setae of these larvae, and I personally discovered that the setae are indeed quite painful, however, the effect does not last long.

In late July, 1941, a few days after the *mendocino* larvae were taken, over 50 larvae of *Pseudohazis eglanterina* were obtained from *Ceanothus thyrsiflorus* Esch. These larvae were almost ma-

ture when taken, and after feeding for from one to eight days, either succumbed to parasites or attempted to pupate. Thirty-one died from *Apanteles* parasites. Others formed cells even when covered with *Apanteles* cocoons, but failed to pupate. Only six pupae formed from the total number, and of these six, five emerged tachinids during the winter. Only a single adult was obtained from more than fifty larvae. I do not believe this to be an extreme case of parasitism. An almost similar result was obtained from larvae of *Papilio philenor hirsuta* Skin., in 1938, from Putah Canyon, Yolo County, California. Where larvae are taken nearly full grown, parasitism is far more marked than in larvae taken in the early instars.

While collecting in the White Mountains of California, near Benton Station, Mono County, C. W. Bowles and the author took a large number of saturniid larvae on *Salix* sp., along a small watercourse. In view of the location and the food plant, these are circumstantially considered to be the larvae of *Platysamia gloveri* Stkr. Attempts to rear these larvae resulted in complete failure, all specimens falling victims to *Apanteles* previous to pupation.

I have been informed by Mr. J. W. Johnson that this is the first record of larvae of this species from a California locality, although the adults have been taken within the state on several occasions. Mr. Johnson agreed that the larvae were most likely to be *gloveri*, and suggested the inclusion of their occurrence, in these notes. It seems logical that *gloveri* should include in its range that part of California which falls within the Great Basin region.

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## AMERICAN COMMITTEE ON ENTOMOLOGICAL NOMENCLATURE

The name of the American Commission on Scientific Nomenclature in Entomology has recently been changed to American Committee on Entomological Nomenclature. The present officers are C. F. W. Muesebeck, Bureau of Entomology and Plant Quarantine, Washington 25, D. C., *Chairman*, and E. G. Linsley, University of California, Berkeley 4, California, *Secretary*. Communications may be addressed to either of the above officers.

# PACIFIC COAST ENTOMOLOGICAL SOCIETY

M. A. STEWART, *President* E. G. LINSLEY, *Secretary*
F. P. KEEN, *Vice-President* R. C. MILLER, *Treasurer*

## PROCEEDINGS

### One Hundred and Eighty-first Meeting

The one hundred and eighty-first meeting of the Pacific Coast Entomological Society was held at 2:30 p.m. on March 25, 1944, in the entomological laboratories of the California Academy of Sciences, San Francisco. President Stewart in the chair. The following members were present: M. A. Stewart, E. G. Linsley, F. M. Prince, E. C. Van Dyke, D. N. Murphy, A. E. Michelbacher, C. D. Duncan, W. C. Reeves, P. Moorhead, F. N. Driver, R. F. Smith, R. W. L. Potts, J. L. Gressitt, E. R. Leach, R. C. Miller. Visitors were present as follows: Mr. Pedro Galindo, Mr. M. W. Allen, Mr. M. Reed, Miss B. Patterson, Miss B. J. Franseen, Mr. G. L. Brown, Mr. T. Hutchins, Mr. A. Branngan, Mr. J. E. Ryus, Mr. W. J. Chamberlain, Mr. M. Marquis, Mr. M. Garcia, Mr. J. McCarty, and Mr. R. Schuster.

The minutes of the previous meeting were read and approved.

The Membership Committee proposed the following names for membership: Mr. Paul R. Jones, Mr. A. L. Deaver, Mr. Pedro Galindo, and Mr. M. W. Allen. The motion was made and passed that the Secretary cast a unanimous ballot for their election.

President Stewart raised the question of the desirability of holding an annual field trip in 1944. After some discussion, Mr. R. F. Smith moved that in view of transportation difficulties no attempt be made to hold a field trip this year. The motion was seconded and passed. Dr. Van Dyke moved that a meeting be held at the Academy in the latter part of June in place of the annual field trip. The motion was seconded and passed.

Dr. Duncan, Dr. Van Dyke, and others reported the whereabouts and present assignments of various Society members now serving in the armed forces.

Mr. R. F. Smith reported that he was anxious to learn the effect of the current abnormally dry season upon the populations of *Colias eurytheme*. He requested members to be on the look-out for information on the subject whenever the opportunity arose.

Dr. Duncan recorded finding unusually long Gordian hair worms in Jerusalem crickets in San Jose, one thirteen inches long, another twenty-eight inches long. He mentioned that the worms had emerged in a dry environment in the absence of water. Mr. Allen

commented that specimens 36 and 42 inches long had been recorded from the Mormon cricket.

President Stewart then presented Mr. J. Linsley Gressitt, a Society member recently repatriated from occupied China, who addressed the Society upon "Entomological Experiences in China."

Mr. Gressitt stated that the experiences of an entomologist stationed in China are apt to be very different from those of one in this country. For entomology is practically undeveloped in China, as compared with the United States. Entomology has been largely fostered in China by Americans and French, particularly as far as education in entomology within China is concerned. The Japanese have also played a part. Much of the early insect collecting in China was done by French, British, Russians and Germans. Educational institutions playing the main role in China in recent years include the American Christian Colleges in China, among them Lingnan University of Canton where the speaker was stationed for four years or so, the French Catholic universities in Teintsin and Shanghai, and several of the Chinese national universities, such as Sun Yat-sen, Kwangsi, Szechuan, Central, and others. Research institutions in China dealing with entomology include the Academia Sinica and the National Agriculture Research Institute, both to some extent subsidized by American money, and the Shanghai Science Institute, a Japanese institution. Other organizations such as the Science Society of China have fostered research and publication.

Among entomologists prominent in China Mr. Gressitt mentioned Sicien Chen and his wife Yon-yon Zia of the Academia Sinica, C. F. Wu of Yenching University, F. C. Wu and Gaines Liu of the National Agriculture Research Institute, C. L. Liu of Tsing-hua University, C. Y. Liu of Kwangsi University, Prof. W. E. Hoffmann of Lingnan University, Prof. C. R. Kellogg of Fukien Christian University, Prof. B. A. Slocum of the University of Nanking, Prof. A. W. March of Hangchow Christian College and Fathers O. Piel and B. Becquart of Universite l'Aurore in Shanghai. Several American entomologists have in the past spent one or more years teaching or helping to organize entomology in China. These include J. G. Needham, C. W. Woodworth, E. C. Van Dyke, W. A. Riley and C. W. Howard. The latter two were at Lingnan University, where also Dr. R. C. Miller, director of the California Academy of Sciences, was in charge of zoology for a time.

Prominent works on Chinese insects or entomology referred to by Mr. Gressitt included C. F. Wu's "Catalog of Chinese Insects" and works on aquatic insects, Needham's "Dragonflies of China," Hoffmann's "Catalog of Scutelleroidea . . . ," Ouchi's "Bibliography of Chinese Insects," Yang's work on Heteroptera, work on Orthoptera by Chang and Tinkham, on Homoptera by Metcalf, Funkhauser and Gaines Liu, on Siphonaptera by C. Y. Liu, Vespidae by C. L. Liu and Coleoptera by Sicien Chen and the speaker. Some

groups, such as Diptera, Hymonoptera, Lepidoptera and others, have hardly been studied except for scattered descriptions of species published in Europe.

Economic entomology is even less developed than systematic entomology in China. This is partly for economic reasons since the low living standards of Chinese farmers prevents their utilizing chemical control of insect pests on their own account, and also may be partly due to the difficulty of changing long-established agricultural practices. The lag is also in part attributable to lack of government funds for agricultural research and a scarcity of well-trained entomologists. With the help of the institutions mentioned above, and the impetus of the war, rapid progress is being made in certain lines, in spite of the difficult conditions that prevail at present.

At present about the only general types of control that can be recommended are cultural and mechanical methods, since chemicals are practically unavailable, even if the farmers had the means to buy them. Before agricultural entomology can be brought to compare in any degree with that in the United States, the living standards of the farmers, who form a large part of the population of China, must be improved or the government must furnish materials and machinery for cooperative use. Biological control offers an undeveloped field in China, but may not play as great a part as it does in this country since many of China's serious pests are native, and a lesser proportion introduced from foreign countries than is the case here.

Among prominent pests the speaker encountered in South China were the Laichee Stink-bug, rice borers, rice beetles (criocerids and hispids), roundheaded borers, scales, bugs, and leaf-hoppers on *Citrus*, lantern flies and other fulgorids on various fruit trees or shrubs, mulberry and fig borers (cerambycids), flea-beetles and galerucids on vegetables, *Citrus* and other plants, the banana weevil and banana leaf-roller (a large hesperiid), the Laichee and Lungngan (Longan) cerambycid borer, wax-moth, cabbage butterfly and grain weevils and moths.

Mr. Gressitt reported that his work at Lingnan University largely concerned the care of the collections in the Lingnan Natural History Museum and the development of the insectary of the Natural History Survey where the life-histories of many of the local insect pests were being studied. Complete preserved material of the immature stages of these pests or local insects was being assembled, as well as data. The speaker also had the opportunity of making three trips into Free China, two in northern Kwantung and the other through Indo-China into Yunnan, Kweichow and Szechuan provinces in West China, as well as collecting in Hong Kong from time to time. Because of the Japanese occupation of Canton, Lingnan University was divided in several places: Canton, Hong Kong and later Free China. Thus the educational as well as research and travel facilities were consider-

ably hampered. In addition to work for Lingnan University, the speaker spent a few months collecting parasites of the red scale in Hong Kong and Canton for shipment by clipper to California, for the Citrus Experiment Station of the University of California. After the United States entered the war Prof. Hoffmann and the speaker were allowed to continue research on the Lingnan campus for about a year and were even able to publish several papers, called Special Publications of the Lingnan Natural History Survey and Museum. Following this period came internment and then repatriation to this country via the "Gripsholm" in December, 1943.

Mr. Gressitt's talk was accompanied by movies and slides taken at Canton, Hong Kong and in Free China.

Following a discussion of Mr. Gressitt's paper the meeting adjourned.—E. G. LINSLEY, Secretary.

## One Hundred and Eighty-second Meeting

The one hundred and eighty-second meeting of the Pacific Coast Entomological Society was held at 2 p.m. on June 24, 1944, in the entomological laboratories of the California Academy of Sciences, San Francisco. President Stewart in the chair. The following members were present: M. A. Stewart, E. G. Linsley, R. C. Miller, J. L. Gressitt, R. F. Smith, E. C. Van Dyke and E. O. Essig. Visitors were present as follows: Prof. Herman A. Scullen, Mr. Joseph E. Ryus, and Mr. William Russell.

The minutes of the previous meeting were read and accepted.

The Membership Committee proposed the following names, Dr. Heber C. Donohoe, Mr. D. A. Zanette, and Mr. Charles Parsell, Jr. They were duly elected to membership.

Dr. Van Dyke exhibited a new species of dobson fly, *Neohermes nigrinus* Van Dyke, calling attention to the fact that much work in neuropteroids remains to be done in the west. He also exhibited two boxes of Coleoptera sent by Dr. Ross from New Guinea. He noted especially a species of *Pachyrhynchus*, a group formerly thought to be restricted to the Philippine fauna.

Dr. Van Dyke reported the capture in the spring of 1944 of a mating pair of *Bombus vosnesenskii*. The female was freshly emerged. The male appeared worn. He stated that it was generally believed that bumblebees mated in the autumn only, but this observation suggested that there were two broods. Dr. Linsley remarked that in 1942 he had captured large numbers of males of *B. edwardsii* and a few of *B. vosneseskii* and *B. sitkensis* in early spring in Madera and Mariposa counties and in the previous year had taken a few males of *edwardsii* in Shasta County. He suggested that the production of vernal males might be characteristic of certain western bumblebees and expressed the opinion that it did not necessarily imply two broods.

President Stewart then presented Dr. R. C. Miller who addressed the Society on the subject "What is a species?" Dr. Miller stated that as soon as the Linnean concept of a species as a sep-

arate, permanent, and more or less easily recognizable, entity began to prove untenable, the whole problem of what constitutes a species fell into a state of confusion from which it has not emerged. Thus one finds views of working taxonomists ranging all the way from those who believe that positive (e.g. genetic) criteria can be found for segregating species to those who frankly consider species to be arbitrary groupings of individuals for the convenience of biologists in arranging or discussing them. As a matter of fact, even taxonomists who adhere to the former of these ideas in theory, often follow the latter in practise. Accordingly, as a working definition Dr. Miller proposed consideration of the following:

"A species is a group of closely similar organisms segregated on the basis of characters that can be recognized by the average trained biologist."

Many will object that "specialist" should be substituted for "average trained biologist." But if we grant this, we drift dangerously toward taxonomic authoritarianism, under which a species becomes whatever Dr. X or Professor Y says is a species.

The lack of agreement as to what constitutes a species emphasizes the importance of the type, and of promptly depositing type material in a recognized museum where it will be permanently available for study by present and future investigators.

After a discussion of Dr. Miller's paper the meeting adjourned. —E. G. LINSLEY, Secretary.

## One Hundred and Eighty-third Meeting

The one hundred and eighty-third meeting of the Pacific Coast Entomological Society was held at 2:30 p.m. on October 7, 1944, in the entomological laboratories of the California Academy of Sciences. The following members were present: F. P. Keen, E. G. Linsley, R. F. Smith, J. L. Gressitt, N. F. Olson, A. E. Michelbacher, C. D. Duncan, E. C. Van Dyke, P. Moorhead, and R. W. L. Potts. Visitors were present as follows: E. A. Steinhaus, A. L. Burroughs, P. H. Arnaud.

The minutes of the previous meeting were read and approved.

The Membership Committee proposed Prof. H. A. Scullen for membership in the Society. He was duly elected.

Dr. E. C. Van Dyke exhibited six boxes of mounted insects from the more than fifty thousand specimens sent back by Dr. E. S. Ross from New Guinea.

Dr. C. D. Duncan exhibited an extremely interesting collection of unusually grotesque neotropical Membracidae. He also called attention to the discovery at Mt. Hermon in Santa Cruz County, California, of a large colony of *Vermelio*, a genus which had been previously regarded as restricted to higher elevations in the state.

Mr. R. F. Smith reported a large migration of *Aglais californica* late in the summer of 1944 and called attention to the fact that he was preparing a summary of the literature pertaining to

migrations of this species and would welcome any first-hand observations on the subject. Mr. F. P. Keen remarked that early in the season there was a serious outbreak of the caterpillar on *Ceanothus* in the Shasta region.

Mr. Keen also commented that in general this had been a year of minor barkbeetle activity along the Pacific Coast but that defoliators had been serious in certain local areas. He mentioned particularly outbreaks of *Perionia variana* and a lodgepole pine sawfly (*Neodiprion* sp.). The latter species was responsible for the defoliation of about 25 square miles of lodgepole pine in Oregon, as a result of an infestation which had apparently been building up for at least three years.

In response to a question by Dr. Linsley, Mr. Keen commented on an outbreak of the Englemann spruce beetle in the Grand Mesa and White Mesa, Colorado. The species had not previously been observed in epidemic numbers for a great many years.

Mr. Keen then presented Prof. Edward A. Steinhaus of the Department of Bacteriology, University of California, who delivered an illustrated lecture on Intracellular Organisms in Insects. Prof. Steinhaus pointed out that some of the most interesting of all biologic relationships between microorganisms and insects are those of intracellular parasites and symbiosis. Within the tissue cells of many arthropods may be found apparently living, nonpathogenic organisms. These intracellular organisms frequently live in specialized cells or structure called mycetocytes and mycetomes. Various types of these were discussed and illustrated by lantern slides. These organisms are not only transmitted directly from one generation to the next but they are also present in every representative of the species. In the case of the aphids the path of transmission of the symbiotes was traced from the follicular epithelium of the parent to the definitely formed mycetome of the offspring. In certain bostrychid beetles, the organisms from the mycetomes invade the lobes of the testes, multiply, and mix with the sperm. They then pass through the micropyle of the fully formed egg during its passage to the outside, and thus the infection is accomplished. Transmission of the symbiotes via the outside of the egg shell was shown in the case of *Stegobium paniceum*. Other intimate and little understood relationships were discussed and illustrated. For the most part these intracellular organisms are of the nature of bacteria or yeasts, and occasionally fungi.

As to the role of these symbiotic microorganisms in the life processes of the host very little definite information is at hand. In some cases, at least, the symbiotes apparently supply vitamins necessary for normal insect development.

After a discussion of Dr. Steinhaus' paper, the meeting was adjourned.—E. G. LINSLEY, Secretary.

## One Hundred and Eighty-fourth Meeting

**The one hundred and eighty-fourth meeting of the Pacific Coast**

Entomological Society was held at 2:30 p.m. on January 6, 1945, in the entomological laboratories of the California Academy of Sciences. The following members were present: M. A. Stewart, E. G. Linsley, F. P. Keen, E. C. Van Dyke, P. Moorhead, A. E. Michelbacher, W. M. Pearce, R. W. L. Potts, R. F. Smith, M. W. Allen, J. L. Gressitt, R. C. Miller, and C. D. Duncan. Visitors were present as follows: Mr. L. R. Brown, Mr. R. P. Allen, Mr. J. Gomez. Dr. E. A. Steinhaus, Miss R. Noakes, Mr. A. L. Burroughs, Mrs. B. Prendergast, and Miss H. L. Pehrson.

The minutes of the previous meeting were read and approved.

The Membership Committee proposed Prof. Carl J. Drake, Dr. E. A. Steinhaus, Mr. Robert P. Allen, and William Peterman, Inc., for membership in the Society. They were duly elected.

President Stewart asked for the annual report from the Treasurer. Dr. Miller presented the report and Dr. Van Dyke moved that the report be accepted and that the Society extend its thanks to Dr. Miller for the excellent work wihch he had performed in connection with this office. The motion was seconded and unanimously passed.

The Nominating Committee proposed the following officers for 1945: F. P. Keen, President; C. D. Duncan, Vice-president; E. G. Linsley, Secretary, and R. C. Miller, Treasurer. The motion was made, seconded and passed that the Secretary cast a unanimous ballot for their election.

Dr. Stewart turned the chair over to the new president, Mr. Keen, after expressing appreciation to the officers and members for support which had been extended to him during his term of office and after calling attention to the great responsibility which scientific societies must assume at present in order to maintain standards and culture in the face of strong pressures to the contrary.

Dr. Van Dyke exhibited a copy of G. V. Hudson's "The Butterflies and Moths of New Zealand" which the Academy had recently received as a gift from the New Zealand legation in Washington.

Dr. Steinhaus mentioned his interest in bacterial, protozoal and viral diseases of insects and expressed the hope that members would assist him in the collection of material for study.

Mr. Keen then presented Dr. Stewart who delivered a most thought-provoking address entitled "Professional Training in Entomology" (see p. 1).

Following Dr. Stewart's address, the meeting adjourned.—E. G. LINSLEY, Secretary.